

Impact of Irrigation, Cutting, and Fertilization on the Phenology of Sahelian ranges

A.J.A. N'GORAN^{1,2,3,4}, OUSMANE NDIAYE^{1,2}, D. NGOM^{2,3}, O. DIATTA^{2,3}, S. DIATTA^{2,3}, H. HAILU², C. F. J. FASSINOU^{1,2,3}, P. SALGADO^{2,4}, S. TAUGOURDEAU^{2,4},
jokebedngoran@gmail.com

1 ISRA/CRZ-Dahra, Sénégal, 2 PPZS, Dakar, Sénégal, 3 UCAD FST Département BV, Dakar, Sénégal, 4 UMR SELMET, CIRAD INRA SupAgro Univ Montpellier, France.

1- Introduction

Herbaceous plants are main feed source of pastoral livestock systems. These plants productivity are very dependent on rainfall conditions. The effect of different management practices and water regime on herbs phenology in savanna ecosystem still poorly understood. This study is designed to understand the impact of different practices managements and rainfall regimes on the phenology of Sahelian herbaceous plants.



Sahelian rangeland in rainy season (@STaugourdeau)

2- Methods



Flowering of fast growing species stage (left, 27/07/21) and fructification of most species (right, 04/09/21) (@AJAN'goran)

Table I. Lists of treatments carried out, irrigation (blue), cutting (green), fertilizer (orange)

Treatments	Quantity of water (mm/m ²)	Start date of irrigation (2021)	Duration (months)	Cutting height	Cutting period	Fertilizer (kg ha ⁻¹)	
2	120	mid-July	1	not done	not done	not done	
3	120	mid-August	1				
4	100	mid-July	2				
5	100	mid-August	2				
6	100	mid-August	2				
7	100	mid-July	2	0 cm from the ground	27/07/21	not done	
11	100	mid-July	2	0 cm from the ground	04/09/21		
12	100	mid-July	2	5 cm from the ground	27/07/21		
10	100	mid-July	2	5 cm from the ground	04/09/21		
8	100	mid-July	2	0 cm from the ground	27/07/21		
9	100	mid-July	2	0 cm from the ground	04/09/21		
13	100	mid-July	2	5 cm from the ground	27/07/21		
14	100	mid-August	2	5 cm from the ground	04/09/21		
15	100	mid-August	2	0 cm from the ground	27/07/21		
16	100	mid-August	2	0 cm from the ground	04/09/21		
17	100	mid-August	2	5 cm from the ground	27/07/21		
18	100	mid-August	2	5 cm from the ground	04/09/21		
18	100	mid-July	2				1,000
19	100	mid-July	2				2,000
20	100	mid-July	2				1,000
21	100	mid-July	2				2,000
22	100	mid-August	2				1,000

- 88 plots of 1 m² delimited in the *Centre de Recherches Zootechniques de Dahra* (15°21' N 15°26' W), received 379 mm from the beginning of the rainy season to October 12, 2021.

- Treatments tested: 5 on irrigation, 12 on cutting height, and 5 on fertilization period (table 1)
- Monitoring of relative plant coverage at the vegetative stage (%V), reproductive stage (%F), and senescence (%S) by plot every 10 days after the first rain until the end of the season

3- Results and conclusion

- Non-significant effect of fertilization, irrigation, and cutting on phenology at the beginning of the season, before cutting

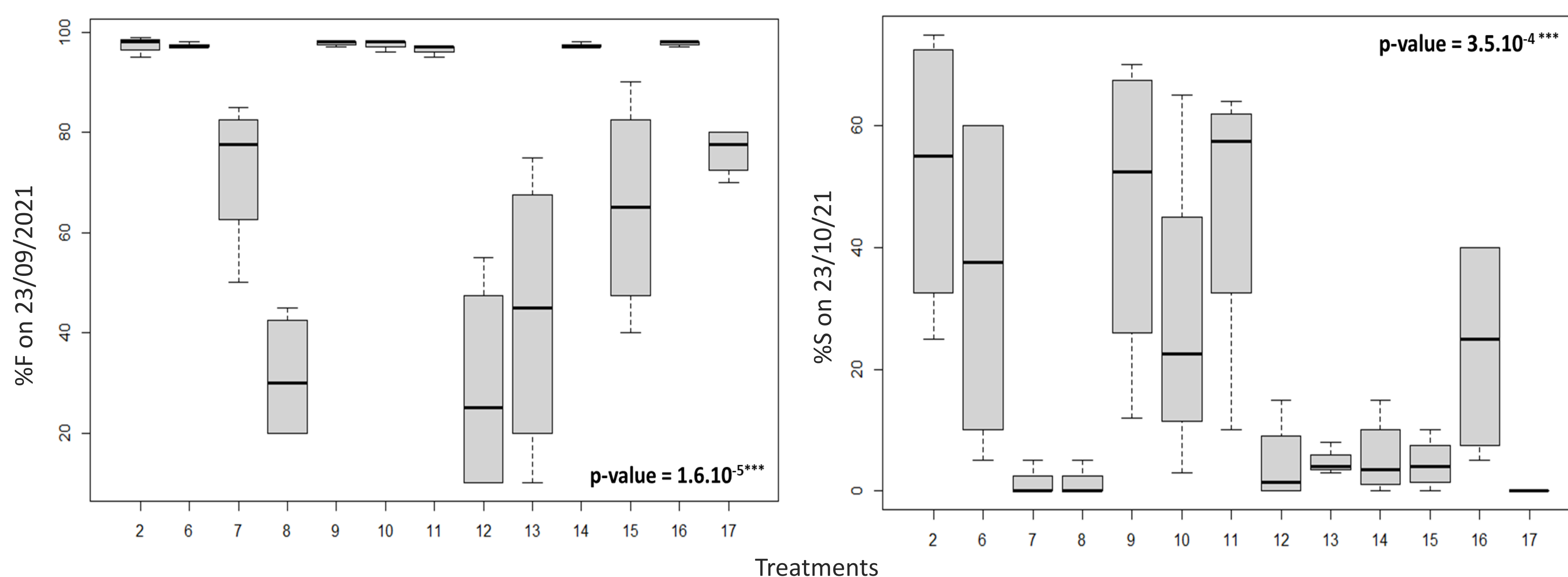


Figure 1. Average percentage of the flowering stage (%F) and senescence (%S) stage of cutting treatments, at different herbaceous vegetation monitoring dates at CRZ Dahra

- Cutting period begins to have a significant effect after the first cut on the %V and %F during the season,
- At the end of the season, in addition to the effect of the cutting period on the %V and %F, an effect of the cutting height, coupled or not with irrigation, appeared on vegetative, flowering, and senescence

At the beginning of the season, before cutting, irrigation has a non significant negative effect on leafing. Then during the season, when the rains become regular and allow to satisfy the needs of the plants this effect disappears. Only the effect of cutting is expressed until the end of the season.